



tgg gaa att ttc cta gaa cat gtc gaa caa ctt ata aat caa caa ata Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Asn Gln Gln Ile 100 105 110	336
aca gaa aat gct agg aat acg gca ctt gct cga tta caa ggt tta gga Thr Glu Asn Ala Arg Asn Thr Ala Leu Ala Arg Leu Gln Gly Leu Gly 115 120 125	384
gat tcc ttt aga gcc tat caa cag tca ctt gaa gat tgg cta gaa aac Asp Ser Phe Arg Ala Tyr Gln Gln Ser Leu Glu Asp Trp Leu Glu Asn 130 135 140	432
cgt gat gat gca aga acg aga agt gtt ctt tat acc caa tat ata gcc Arg Asp Asp Ala Arg Thr Arg Ser Val Leu Tyr Thr Gln Tyr Ile Ala 145 150 155 160	480
tta gaa ctt gat ttt ctt aat gcg atg ccg ctt ttc gca att aga aac Leu Glu Leu Asp Phe Leu Asn Ala Met Pro Leu Phe Ala Ile Arg Asn 165 170 175	528
caa gaa gtt cca tta tta atg gta tat gct caa gct gca aat tta cac Gln Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His 180 185 190	576
cta tta tta ttg aga gat gcc tct ctt ttt ggt agt gaa ttt ggg ctt Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Phe Gly Leu 195 200 205	624
aca tcg cag gaa att caa cgt tat tat gag cgc caa gtg gaa caa acg Thr Ser Gln Glu Ile Gln Arg Tyr Tyr Glu Arg Gln Val Glu Gln Thr 210 215 220	672
aga gat tat tcc gac tat tgc gta gaa tgg tat aat aca ggt cta aat Arg Asp Tyr Ser Asp Tyr Cys Val Glu Trp Tyr Asn Thr Gly Leu Asn 225 230 235 240	720
agc ttg aga ggg aca aat gcc gca agt tgg gtg cgt tat aat caa ttc Ser Leu Arg Gly Thr Asn Ala Ala Ser Trp Val Arg Tyr Asn Gln Phe 245 250 255	768
cgt aga gat cta acg tta ggg gta tta gat cta gtg gca cta ttc cca Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro 260 265 270	816
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agg gaa gtt tat aca gac gca att gga gca aca ggg gta aat atg gca Arg Glu Val Tyr Thr Asp Ala Ile Gly Ala Thr Gly Val Asn Met Ala 290 295 300	912
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aat acc tca acg cat ggg tct acc aat act tct att aat cct gta aga Asn Thr Ser Thr His Gly Ser Thr Asn Thr Ser Ile Asn Pro Val Arg 370 375 380	1152
tta tca ttc ttc tct cga gac gta tat tgg act gaa tca tat gca gga Leu Ser Phe Phe Ser Arg Asp Val Tyr Trp Thr Glu Ser Tyr Ala Gly 385 390 395 400	1200
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gga ggg gat ata atc cga act aac gtt aat ggt agt gta cta agt atg Gly Gly Asp Ile Ile Arg Thr Asn Val Asn Gly Ser Val Leu Ser Met 530 535 540	1632

ggt ctt aat ttt aat aat aca tca tta cag cgg tat cgc gtg aga gtt		1680
Gly Leu Asn Phe Asn Asn Thr Ser Leu Gln Arg Tyr Arg Val Arg Val		
545 550 555 560		
cgt tat gct gct tct caa aca atg gtc ctg agg gta act gtc gga ggg		1728
Arg Tyr Ala Ala Ser Gln Thr Met Val Leu Arg Val Thr Val Gly Gly		
565 570 575		
agt act act ttt gat caa gga ttc cct agt act atg agt gca aat gag		1776
Ser Thr Thr Phe Asp Gln Gly Phe Pro Ser Thr Met Ser Ala Asn Glu		
580 585 590		
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Ser Leu Thr Ser Gln Ser Phe Arg Phe Ala Glu Phe Pro Val Gly Ile		
595 600 605		
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Gly Arg Gln Thr Phe His Phe Asp Lys Ile Glu Phe Ile Pro Ile Thr		
625 630 635 640		
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Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Glu Ala Val		
645 650 655		
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Asn Ala Leu Phe Thr Asn Thr Asn Pro Arg Arg Leu Lys Thr Asp Val		
660 665 670		
aca gat tat cat att gat caa gta tcc aat tta gtg gcg tgt tta tcg		2064
Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Ala Cys Leu Ser		
675 680 685		
gat gaa ttc tgc tta gat gaa aag aga gaa tta ctt gag aaa gtg aaa		2112
Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys		
690 695 700		
tat gcg aaa cga ctc agt gat gaa aga aac tta ctc caa gat cca aac		2160
Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn		
705 710 715 720		
ttc aca tcc atc aat aag caa cca gac ttc ata tct act aat gag caa		2208
Phe Thr Ser Ile Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln		
725 730 735		
tcg aat ttc aca tct atc cat gaa caa tct gaa cat gga tgg tgg gga		2256
Ser Asn Phe Thr Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly		
740 745 750		
agt gag aac att aca atc cag gaa gga aat gac gta ttt aaa gag aat		2304
Ser Glu Asn Ile Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn		
755 760 765		

tac gtc aca cta ccg ggg act ttt aat gag tgt tat ccg acg tat tta Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu 770 775 780	2352
tat caa aaa ata gga gag tcg gaa tta aaa gct tat act cgc tac caa Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln 785 790 795 800	2400
tta aga ggg tat att gaa gat agt caa gat tta gag ata tat ttg att Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile 805 810 815	2448
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Tyr Leu Ser Glu Leu Ser Val Ile Pro Gly Val Asn Ala Glu Ile Phe 995	1000	1005	
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1015			1020
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1065			1070
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1080			1085
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1095			1100
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1110			1115
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1130			1135
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1160			1165
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1175			1180
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1190			1195
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1220

1225

&lt;210&gt; 2

&lt;211&gt; 1228

&lt;212&gt; PRT

&lt;213&gt; Bacillus thuringiensis

&lt;400&gt; 2

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1															15

Ile	Pro	Ala	Val	Ser	Asn	His	Ser	Thr	Gln	Met	Asp	Leu	Ser	Pro	Asp
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Ala	Arg	Ile	Glu	Asp	Ser	Leu	Cys	Ile	Ala	Glu	Gly	Asn	Asn	Ile	Asn
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Pro	Leu	Val	Ser	Ala	Ser	Thr	Val	Gln	Thr	Gly	Ile	Asn	Ile	Ala	Gly
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Arg	Ile	Leu	Gly	Val	Leu	Gly	Val	Pro	Phe	Ala	Gly	Gln	Ile	Ala	Ser
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Phe	Tyr	Ser	Phe	Leu	Val	Gly	Glu	Leu	Trp	Pro	Arg	Gly	Arg	Asp	Gln
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Trp	Glu	Ile	Phe	Leu	Glu	His	Val	Glu	Gln	Leu	Ile	Asn	Gln	Gln	Ile
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Thr	Glu	Asn	Ala	Arg	Asn	Thr	Ala	Leu	Ala	Arg	Leu	Gln	Gly	Leu	Gly
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Asp	Ser	Phe	Arg	Ala	Tyr	Gln	Gln	Ser	Leu	Glu	Asp	Trp	Leu	Glu	Asn
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Arg	Asp	Asp	Ala	Arg	Thr	Arg	Ser	Val	Leu	Tyr	Thr	Gln	Tyr	Ile	Ala
											145			160	

Leu	Glu	Leu	Asp	Phe	Leu	Asn	Ala	Met	Pro	Leu	Phe	Ala	Ile	Arg	Asn
											165			175	

Gln	Glu	Val	Pro	Leu	Leu	Met	Val	Tyr	Ala	Gln	Ala	Ala	Asn	Leu	His
											180			190	

Leu	Leu	Leu	Arg	Asp	Ala	Ser	Leu	Phe	Gly	Ser	Glu	Phe	Gly	Leu
											195			205

Thr	Ser	Gln	Glu	Ile	Gln	Arg	Tyr	Tyr	Glu	Arg	Gln	Val	Glu	Gln	Thr
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Arg	Asp	Tyr	Ser	Asp	Tyr	Cys	Val	Glu	Trp	Tyr	Asn	Thr	Gly	Leu	Asn
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Ser	Leu	Arg	Gly	Thr	Asn	Ala	Ala	Ser	Trp	Val	Arg	Tyr	Asn	Gln	Phe
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Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro  
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 Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr  
 275 280 285  
 Arg Glu Val Tyr Thr Asp Ala Ile Gly Ala Thr Gly Val Asn Met Ala  
 290 295 300  
 Ser Met Asn Trp Tyr Asn Asn Ala Pro Ser Phe Ser Ala Ile Glu  
 305 310 315 320  
 Thr Ala Val Ile Arg Ser Pro His Leu Leu Asp Phe Leu Glu Gln Leu  
 325 330 335  
 Thr Ile Phe Ser Thr Ser Arg Trp Ser Ala Thr Arg His Met Thr  
 340 345 350  
 Tyr Trp Arg Gly His Thr Ile Gln Ser Arg Pro Ile Gly Gly Leu  
 355 360 365  
 Asn Thr Ser Thr His Gly Ser Thr Asn Thr Ser Ile Asn Pro Val Arg  
 370 375 380  
 Leu Ser Phe Phe Ser Arg Asp Val Tyr Trp Thr Glu Ser Tyr Ala Gly  
 385 390 395 400  
 Val Leu Leu Trp Gly Ile Tyr Leu Glu Pro Ile His Gly Val Pro Thr  
 405 410 415  
 Val Arg Phe Asn Phe Arg Asn Pro Gln Asn Thr Phe Glu Arg Gly Thr  
 420 425 430  
 Ala Asn Tyr Ser Gln Pro Tyr Glu Ser Pro Gly Leu Gln Leu Lys Asp  
 435 440 445  
 Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn Tyr Glu  
 450 455 460  
 Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ser Gln Ser Arg  
 465 470 475 480  
 Val His Val Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp Arg Thr  
 485 490 495  
 Asn Thr Ile Ser Ser Asp Ser Ile Thr Gln Ile Pro Leu Val Lys Ser  
 500 505 510  
 Phe Asn Leu Asn Ser Gly Thr Ser Val Val Ser Gly Pro Gly Phe Thr  
 515 520 525  
 Gly Gly Asp Ile Ile Arg Thr Asn Val Asn Gly Ser Val Leu Ser Met  
 530 535 540  
 Gly Leu Asn Phe Asn Asn Thr Ser Leu Gln Arg Tyr Arg Val Arg Val  
 545 550 555 560

Arg Tyr Ala Ala Ser Gln Thr Met Val Leu Arg Val Thr Val Gly Gly  
 565 570 575  
 Ser Thr Thr Phe Asp Gln Gly Phe Pro Ser Thr Met Ser Ala Asn Glu  
 580 585 590  
 Ser Leu Thr Ser Gln Ser Phe Arg Phe Ala Glu Phe Pro Val Gly Ile  
 595 600 605  
 Ser Ala Ser Gly Ser Gln Thr Ala Gly Ile Ser Ile Ser Asn Asn Ala  
 610 615 620  
 Gly Arg Gln Thr Phe His Phe Asp Lys Ile Glu Phe Ile Pro Ile Thr  
 625 630 635 640  
 Ala Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Glu Ala Val  
 645 650 655  
 Asn Ala Leu Phe Thr Asn Thr Asn Pro Arg Arg Leu Lys Thr Asp Val  
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 675 680 685  
 Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Leu Glu Lys Val Lys  
 690 695 700  
 Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn  
 705 710 715 720  
 Phe Thr Ser Ile Asn Lys Gln Pro Asp Phe Ile Ser Thr Asn Glu Gln  
 725 730 735  
 Ser Asn Phe Thr Ser Ile His Glu Gln Ser Glu His Gly Trp Trp Gly  
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 Ser Glu Asn Ile Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn  
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 Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Thr Tyr Leu  
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 Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln  
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 Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile  
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 Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr Glu Ser  
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 Val Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro  
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 Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser  
 850 855 860

Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu  
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 885 890 895  
 Val Val Phe Lys Ile Lys Thr Gln Glu Gly His Ala Arg Leu Gly Asn  
 900 905 910  
 Leu Glu Phe Ile Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu Ser Arg  
 915 920 925  
 Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln  
 930 935 940  
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 945 950 955 960  
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 Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg Glu Ala  
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 Tyr Leu Ser Glu Leu Ser Val Ile Pro Gly Val Asn Ala Glu Ile Phe  
 995 1000 1005  
 Glu Glu Leu Glu Gly Arg Ile Ile Thr Ala Ile Ser Leu Tyr Asp Ala  
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 Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly Leu Ala Cys Trp  
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 1075 1080 1085  
 Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr Asp  
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 Glu Leu Lys Phe Lys Asn Cys Glu Glu Glu Val Tyr Pro Thr Asp  
 1105 1110 1115 1120  
 Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gly Thr Ala Val Cys  
 1125 1130 1135  
 Asn Ser Arg Asn Ala Gly Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr  
 1140 1145 1150  
 Ala Ser Val Asn Tyr Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp  
 1155 1160 1165

Val	Arg	Arg	Asp	Asn	His	Cys	Glu	Tyr	Asp	Arg	Gly	Tyr	Val	Asn	Tyr
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Pro	Pro	Leu	Pro	Ala	Gly	Tyr	Met	Thr	Lys	Glu	Leu	Glu	Tyr	Phe	Pro
1185															1200
Glu	Thr	Asp	Lys	Val	Trp	Ile	Glu	Ile	Gly	Glu	Thr	Glu	Gly	Lys	Phe
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Ile	Val	Asp	Ser	Val	Glu	Leu	Leu	Leu	Met	Glu	Glu				
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<212> DNA
<213> Bacillus thuringiensis
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1 5 10 15

aag cct gag gaa gta ttt ttg gat ggg gag agg ata tta cct gat atc 96  
Lys Pro Glu Glu Val Phe Leu Asp Gly Glu Arg Ile Leu Pro Asp Ile  
20 25 30

gat cca ctc gaa gtt tct ttg tcg ctt ttg caa ttt ctt ttg aat aac 144  
Asp Pro Leu Glu Val Ser Leu Ser Leu Leu Gln Phe Leu Leu Asn Asn  
35 40 45

ttt gtt ccg ggg ggg ggg ttt att tca gga tta att gac aaa ata tgg 192  
Phe Val Pro Gly Gly Gly Phe Ile Ser Gly Leu Ile Asp Lys Ile Trp  
50 55 60

ggg gct ttg aga cca tct gaa tgg gaa tta ttt ctt gca cag att gaa 240  
 Gly Ala Leu Arg Pro Ser Glu Trp Glu Leu Phe Leu Ala Gln Ile Glu  
 65 70 75 80

cag ttg att gat cga aga ata gaa gca aca gta aga gca aaa gca atc 288  
 Gln Leu Ile Asp Arg Arg Ile Glu Ala Thr Val Arg Ala Lys Ala Ile  
 85 90 95

gct gaa tta gaa ggt tta ggg aga agt tat caa cta tat gga gag gca 336  
 Ala Glu Leu Glu Gly Leu Gly Arg Ser Tyr Gln Leu Tyr Gly Glu Ala  
 100 105 110

ttt aaa gag tgg gaa aaa act cca gat aac aca gcg gct cggtcg tct aga 384  
Phe Lys Glu Trp Glu Lys Thr Pro Asp Asn Thr Ala Ala Arg Ser Arg  
115 120 125

gta act gag aga ttt cgt ata att gat gct caa att gaa gca aat atc 432

Val Thr Glu Arg Phe Arg Ile Ile Asp Ala Gln Ile Glu Ala Asn Ile			
130	135	140	
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Pro Ser Phe Arg Val Ser Gly Phe Glu Val Pro Leu Leu Ser Val Tyr			
145	150	155	160
acc caa gca gct aat ttg cat ctc gct cta tta aga gat tct gtt att			528
Thr Gln Ala Ala Asn Leu His Leu Ala Leu Leu Arg Asp Ser Val Ile			
165	170	175	
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Phe Gly Glu Arg Trp Gly Leu Ser Thr Thr Asn Val Asn Asp Ile Tyr			
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Asn Arg Gln Val Lys Arg Ile His Glu Tyr Ser Asp His Cys Val Asp			
195	200	205	
acg tat aaa aca gaa tta gaa cgt cta gag ttt aga tct ata gcg caa			672
Thr Tyr Lys Thr Glu Leu Glu Arg Leu Glu Phe Arg Ser Ile Ala Gln			
210	215	220	
tgg aga ata tat aat cag ttt aga agg gaa ttg aca cta acg gta tta			720
Trp Arg Ile Tyr Asn Gln Phe Arg Arg Glu Leu Thr Leu Thr Val Leu			
225	230	235	240
gat att gtc gct ctt ttc ccg aac tat gat ggt aga ctg tat ccg att			768
Asp Ile Val Ala Leu Phe Pro Asn Tyr Asp Gly Arg Leu Tyr Pro Ile			
245	250	255	
cga aca att tct caa ttg aca aga gaa att tat aca tcc cca gta agc			816
Arg Thr Ile Ser Gln Leu Thr Arg Glu Ile Tyr Thr Ser Pro Val Ser			
260	265	270	
gaa ttt tat tat ggt ccc att tat aat cat aat atg att ggt acc ttt			864
Glu Phe Tyr Tyr Gly Pro Ile Tyr Asn His Asn Met Ile Gly Thr Phe			
275	280	285	
att gaa cgg cag cta agg cga cca cat ctt atg gac ttc ttt aac tcc			912
Ile Glu Arg Gln Leu Arg Arg Pro His Leu Met Asp Phe Phe Asn Ser			
290	295	300	
atg acc atg tat aca tca gat aat aga cgg gaa tat tat tgg tca gga			960
Met Thr Met Tyr Thr Ser Asp Asn Arg Arg Glu Tyr Tyr Trp Ser Gly			
305	310	315	320
ctt gaa atg acg gct act ctt act tca gga aat caa gtg tca ttc cct			1008
Ieu Glu Met Thr Ala Thr Leu Thr Ser Gly Asn Gln Val Ser Phe Pro			
325	330	335	
tta gcc ggg act aga ggg aat tca gct cca cca gta tct gtt aga aag			1056
Leu Ala Gly Thr Arg Gly Asn Ser Ala Pro Pro Val Ser Val Arg Lys			
340	345	350	
act ggt gag gga att tat aga ata tta tcg gaa cca ttt tat tca gca			1104
Thr Gly Glu Gly Ile Tyr Arg Ile Leu Ser Glu Pro Phe Tyr Ser Ala			

355	360	365	
cct ttt cta ggc acc agt gtg cta gga agt cgc ggg gaa gaa ttt gct Pro Phe Leu Gly Thr Ser Val Leu Gly Ser Arg Gly Glu Glu Phe Ala 370	375	380	1152
ttt gca tct aat act act aca agt ctg cca tct aca ata tat aga aat Phe Ala Ser Asn Thr Thr Ser Leu Pro Ser Thr Ile Tyr Arg Asn 385	390	395	1200
cgt gga aca gta gat tca tta gtc agc ata ccg cca caa gat tat agc Arg Gly Thr Val Asp Ser Leu Val Ser Ile Pro Pro Gln Asp Tyr Ser 405	410	415	1248
gta cca ccg cac agg ggg tat agt cat tta tta agt cac gtt acg atg Val Pro Pro His Arg Gly Tyr Ser His Leu Leu Ser His Val Thr Met 420	425	430	1296
cac aat agt tct cct ata ttc cac tgg acg cat cgt agt gcg aca cct His Asn Ser Ser Pro Ile Phe His Trp Thr His Arg Ser Ala Thr Pro 435	440	445	1344
aga aat ata att tat cca gat agt atc actcaa atc cca gta gtt aag Arg Asn Ile Ile Tyr Pro Asp Ser Ile Thr Gln Ile Pro Val Val Lys 450	455	460	1392
gct tcg cac ctc tct ggt ggt tca gtt ata aaa gga cct gga cat aca Ala Ser His Leu Ser Gly Gly Ser Val Ile Lys Gly Pro Gly His Thr 465	470	475	1440
ggt gga gat tta ata agc cta cct gta aat aac ttt act cat ttc cga Gly Gly Asp Leu Ile Ser Leu Pro Val Asn Asn Phe Thr His Phe Arg 485	490	495	1488
atc cca ttt cag gca aac act cca caa agg tat cgt att aga att tgt Ile Pro Phe Gln Ala Asn Thr Pro Gln Arg Tyr Arg Ile Arg Ile Cys 500	505	510	1536
tat gcg gca gac tca gat ggg act ttg gat agt gga gtt ttc tta agt Tyr Ala Ala Asp Ser Asp Gly Thr Leu Asp Ser Gly Val Phe Leu Ser 515	520	525	1584
gca gca gca ggg gat ggt ttt aat aca act tct tat agg gcc aca atg Ala Ala Ala Gly Asp Gly Phe Asn Thr Thr Ser Tyr Arg Ala Thr Met 530	535	540	1632
agc cct gaa ggt tcc tta aca tct cgt gat ttt caa ttt tta gat tta Ser Pro Glu Gly Ser Leu Thr Ser Arg Asp Phe Gln Phe Leu Asp Leu 545	550	555	1680
aac aca tcg ttt acc tcc gat gta gca tct aac tta tgg tta cat ttt Asn Thr Ser Phe Thr Ser Asp Val Ala Ser Asn Leu Trp Leu His Phe 565	570	575	1728
ata cgt tat ata cga cca ggg aat ttg tat ata gat aga gcg gaa ttt Ile Arg Tyr Ile Arg Pro Gly Asn Leu Tyr Ile Asp Arg Ala Glu Phe 580	585	590	1776

atc cca gtg gat gca acc ttc gag gca ggt tat aat tta gaa agg gcg Ile Pro Val Asp Ala Thr Phe Glu Ala Gly Tyr Asn Leu Glu Arg Ala 595 600 605	1824
caa aag gcg gtg aat gcc ctg ttt act tct aca aac caa aaa gga tta Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Lys Gly Leu 610 615 620	1872
caa aca gat gtg acg gat tat cat att gat caa gta tcc aat cta gtt Gln Thr Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val 625 630 635 640	1920
gat tgt tta tct gat gag ttt tgc tta gat gaa aag cga aaa ttg tcc Asp Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Lys Leu Ser 645 650 655	1968
gag aaa gtc aaa cag gcg aag cga ctc agt gat gag cg <sup>g</sup> aat tta ctt Glu Lys Val Lys Gln Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu 660 665 670	2016
cag gat tca aat ttc aga ggc atc aat agg gaa caa gac cgt gga tgg Gln Asp Ser Asn Phe Arg Gly Ile Asn Arg Glu Gln Asp Arg Gly Trp 675 680 685	2064
aga gga agt acg gat att act atc caa gga gga aac gat gtt ttc aaa Arg Gly Ser Thr Asp Ile Thr Ile Gln Gly Asn Asp Val Phe Lys 690 695 700	2112
gag aat tac gtt aca cta cca ggt acc ttt gat gcg tgt tat cca aca Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asp Ala Cys Tyr Pro Thr 705 710 715 720	2160
tat ttg tat caa aaa gtc gat gaa tca aaa tta aaa gcc tat acc cgt Tyr Leu Tyr Gln Lys Val Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg 725 730 735	2208
tat caa tta aga ggc tat atc gaa gat agt caa gat tta gaa gtc tat Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Val Tyr 740 745 750	2256
ttg atc cgt tat aat gca aaa tat gaa acg tta aat gtg cca ggt atg Leu Ile Arg Tyr Asn Ala Lys Tyr Glu Thr Leu Asn Val Pro Gly Met 755 760 765	2304
ggt tct tta tgg cca ctt tca gtc gaa agt cca att gga aag tgt gga Gly Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Lys Cys Gly 770 775 780	2352
gaa ccg aat cga tgt gtg cca caa ctt gaa tgg aat ccc gat ttc gat Glu Pro Asn Arg Cys Val Pro Gln Leu Glu Trp Asn Pro Asp Phe Asp 785 790 795 800	2400
tgt tcc tgc aga gac gga gaa aaa tgt gcg cat cat tcg cat cat ttc Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe 805 810 815	2448

tcc ttg gac att gat gtt gga tgg aca gac ttg aat gag aac cta ggt Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asn Leu Gly 820 825 830	2496
ata tgg gtg ata ttc aag att aag aca cag gat ggt cat gca aga cta Ile Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu 835 840 845	2544
gga aat cta gaa ttt ctc gaa gag aaa ccg tta tta gga gaa gcg tta Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu 850 855 860	2592
gcc cgt gtg aag aga gcg gag aaa aaa tgg aga gac aaa cgt gaa ata Ala Arg Val Lys Arg Ala Glu Lys Trp Arg Asp Lys Arg Glu Ile 865 870 875 880	2640
ttg caa tca gaa act aat att gtt tat aaa gaa gca aaa gaa gct gta Leu Gln Ser Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ala Val 885 890 895	2688
gat ggt tta ttc gta gat tcc caa tat gag aga tta caa tct gat acg Asp Gly Leu Phe Val Asp Ser Gln Tyr Glu Arg Leu Gln Ser Asp Thr 900 905 910	2736
aat atc gcc atg att cat gcg gca gat aaa cgc gtt cac cga atc cga Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg 915 920 925	2784
gag gct tat ctg cca gag ctc tcc gtg att cca ggt gtc aat gca gcg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala 930 935 940	2832
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tgc tgg aat gtg aaa ggg cat gta gat ata aaa cag aat ggt cat cgt Cys Trp Asn Val Lys Gly His Val Asp Ile Lys Gln Asn Gly His Arg 980 985 990	2976
tct gtt ctt gtt atc cca gaa tgg gaa gca caa gtt tca caa gaa gtt Ser Val Leu Val Ile Pro Glu Trp Glu Ala Gln Val Ser Gln Glu Val 995 1000 1005	3024
cgt gta tgt cca ggt cgt ggc tac atc ctt cgt gtt aca gcg aac aaa Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Asn Lys 1010 1015 1020	3072
gaa gga tat gga gaa ggc tgc gta acg att cat gag att gag aat cat Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn His 1025 1030 1035 1040	3120
act gaa aaa ctg aag ttt aga aac tgc gaa gaa gag gaa gta tat cca	3168

Thr Glu Lys Leu Lys Phe Arg Asn Cys Glu Glu Glu Val Tyr Pro			
1045	1050	1055	
aac aat aca gga acg tgt aat gat tat act gca cac caa caa ggt aca			3216
Asn Asn Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gln Gly Thr			
1060	1065	1070	
gca gga tgc gca gat gca tgt aat acc cgt aat gtc gga tat gaa gat			3264
Ala Gly Cys Ala Asp Ala Cys Asn Thr Arg Asn Val Gly Tyr Glu Asp			
1075	1080	1085	
gca tat gaa atg aat act aca aca tct gtt aat tac aaa ccg act tac			3312
Ala Tyr Glu Met Asn Thr Thr Ser Val Asn Tyr Lys Pro Thr Tyr			
1090	1095	1100	
gag gaa gaa gta tat aca gat gga cga aga gat aat cct tgt gaa atg			3360
Glu Glu Glu Val Tyr Thr Asp Gly Arg Arg Asp Asn Pro Cys Glu Met			
1105	1110	1115	1120
gaa aga ggt tac aca cca tta cca gtt ggt tat gta aca aaa gaa tta			3408
Glu Arg Gly Tyr Thr Pro Leu Pro Val Gly Tyr Val Thr Lys Glu Leu			
1125	1130	1135	
gaa tac ttc cct gaa aca aat aca gta tgg att gaa att gga gaa acg			3456
Glu Tyr Phe Pro Glu Thr Asn Thr Val Trp Ile Glu Ile Gly Glu Thr			
1140	1145	1150	
gaa ggg aag ttt att gta gac agt gtc gaa tta ctc ctt atg gaa gaa			3504
Glu Gly Lys Phe Ile Val Asp Ser Val Glu Leu Leu Met Glu Glu			
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tag			3507

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Lys Pro Glu Glu Val Phe Leu Asp Gly Glu Arg Ile Leu Pro Asp Ile			
20	25	30	
Asp Pro Leu Glu Val Ser Leu Ser Leu Gln Phe Leu Leu Asn Asn			
35	40	45	
Phe Val Pro Gly Gly Phe Ile Ser Gly Leu Ile Asp Lys Ile Trp			
50	55	60	
Gly Ala Leu Arg Pro Ser Glu Trp Glu Leu Phe Leu Ala Gln Ile Glu			
65	70	75	80
Gln Leu Ile Asp Arg Arg Ile Glu Ala Thr Val Arg Ala Lys Ala Ile			

85	90	95
Ala Glu Leu Glu Gly Leu Gly Arg Ser Tyr Gln Leu Tyr Gly Glu Ala		
100	105	110
Phe Lys Glu Trp Glu Lys Thr Pro Asp Asn Thr Ala Ala Arg Ser Arg		
115	120	125
Val Thr Glu Arg Phe Arg Ile Ile Asp Ala Gln Ile Glu Ala Asn Ile		
130	135	140
Pro Ser Phe Arg Val Ser Gly Phe Glu Val Pro Leu Leu Ser Val Tyr		
145	150	155
Thr Gln Ala Ala Asn Leu His Leu Ala Leu Leu Arg Asp Ser Val Ile		
165	170	175
Phe Gly Glu Arg Trp Gly Leu Ser Thr Thr Asn Val Asn Asp Ile Tyr		
180	185	190
Asn Arg Gln Val Lys Arg Ile His Glu Tyr Ser Asp His Cys Val Asp		
195	200	205
Thr Tyr Lys Thr Glu Leu Glu Arg Leu Glu Phe Arg Ser Ile Ala Gln		
210	215	220
Trp Arg Ile Tyr Asn Gln Phe Arg Arg Glu Leu Thr Leu Thr Val Leu		
225	230	235
Asp Ile Val Ala Leu Phe Pro Asn Tyr Asp Gly Arg Leu Tyr Pro Ile		
245	250	255
Arg Thr Ile Ser Gln Leu Thr Arg Glu Ile Tyr Thr Ser Pro Val Ser		
260	265	270
Glu Phe Tyr Tyr Gly Pro Ile Tyr Asn His Asn Met Ile Gly Thr Phe		
275	280	285
Ile Glu Arg Gln Leu Arg Arg Pro His Leu Met Asp Phe Phe Asn Ser		
290	295	300
Met Thr Met Tyr Thr Ser Asp Asn Arg Arg Glu Tyr Tyr Trp Ser Gly		
305	310	315
Leu Glu Met Thr Ala Thr Leu Thr Ser Gly Asn Gln Val Ser Phe Pro		
325	330	335
Leu Ala Gly Thr Arg Gly Asn Ser Ala Pro Pro Val Ser Val Arg Lys		
340	345	350
Thr Gly Glu Gly Ile Tyr Arg Ile Leu Ser Glu Pro Phe Tyr Ser Ala		
355	360	365
Pro Phe Leu Gly Thr Ser Val Leu Gly Ser Arg Gly Glu Glu Phe Ala		
370	375	380
Phe Ala Ser Asn Thr Thr Ser Leu Pro Ser Thr Ile Tyr Arg Asn		

385	390	395	400
Arg	Gly	Thr	Val
Asp	Ser	Leu	Val
Val	Asp	Ser	Ile
405	410	415	
Tyr	Ser	Pro	Pro
His	Arg	Gly	Tyr
Arg	Gly	Tyr	Ser
420	425	430	
His	Leu	Leu	Ser
Asn	Ser	His	Val
435	440	445	
Ser	Pro	Ile	Thr
Phe	His	Trp	His
450	455	460	
Arg	Asn	Ile	Ile
Tyr	Pro	Asp	Ser
465	470	475	
Ile	Thr	Gln	Ile
Asp	Ser	Pro	Pro
480	485	490	
Gly	Gly	Leu	Ile
Asp	Leu	Ser	Ser
495			
Ile	Pro	Phe	Gln
Asn	Ala	Asn	Thr
500	505	510	
Thr	Pro	Gln	Arg
Arg	Tyr	Arg	Ile
Ile	Cys		
Tyr	Ala	Ala	Asp
515	520	525	
Asp	Ser	Asp	Gly
Ala	Ala	Asp	Thr
530	535	540	
Gly	Phe	Asn	Thr
Asp	Gly	Thr	Ser
545	550	555	
Arg	Phe	Asp	Phe
560			
Asn	Thr	Ser	Phe
565	570	575	
Phe	Thr	Ser	Asp
Asp	Val	Ala	Ser
580	585	590	
Ile	Arg	Tyr	Ile
Arg	Ile	Arg	Pro
595			
Gly	Asn	Leu	Tyr
Asn	Leu	Tyr	Ile
600	605	610	
Tyr	Asn	Leu	Glu
Ala	Gly	Glu	Arg
615	620		
Gln	Lys	Ala	Val
Asn	Ala	Leu	Phe
625	630	635	
Thr	Asp	Val	Thr
Asp	Tyr	Ile	Asp
640			
Gln	Thr	Asp	Gln
Val	Asp	Val	Val
645	650	655	
Asp	Cys	Leu	Ser
660	665	670	
Glu	Lys	Val	Lys
675	680	685	
Gln	Asp	Ser	Asn
Asp	Phe	Arg	Gly
Arg	Gly	Ile	Asn
685			
Gly	Asn	Arg	Glu
Asn	Arg	Gly	Gln
690	695	700	
Gly	Asn	Asp	Asp
705	710	715	
Gly	Asn	Val	Phe
720	725	730	
Asp	Arg	Lys	
735			
Arg	Gly	Ser	Thr
740	745	750	
Gly	Asp	Ile	Thr
755	760	765	
Asp	Ile	Gly	Gly
770	775	780	
Gly	Gly	Asn	Asp
785	790	795	
Asn	Asp	Val	Phe
795	800	805	
Val	Phe	Lys	
810	815	820	
Lys			

690	695	700
Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asp Ala Cys Tyr Pro Thr		
705	710	715
Tyr Leu Tyr Gln Lys Val Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg		
725	730	735
Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Val Tyr		
740	745	750
Leu Ile Arg Tyr Asn Ala Lys Tyr Glu Thr Leu Asn Val Pro Gly Met		
755	760	765
Gly Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Lys Cys Gly		
770	775	780
Glu Pro Asn Arg Cys Val Pro Gln Leu Glu Trp Asn Pro Asp Phe Asp		
785	790	795
Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe		
805	810	815
Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asn Leu Gly		
820	825	830
Ile Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu		
835	840	845
Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Leu Gly Glu Ala Leu		
850	855	860
Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Ile		
865	870	875
Leu Gln Ser Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ala Val		
885	890	895
Asp Gly Leu Phe Val Asp Ser Gln Tyr Glu Arg Leu Gln Ser Asp Thr		
900	905	910
Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Arg Ile Arg		
915	920	925
Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala		
930	935	940
Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Tyr Ser Leu Tyr		
945	950	955
Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser		
965	970	975
Cys Trp Asn Val Lys Gly His Val Asp Ile Lys Gln Asn Gly His Arg		
980	985	990
Ser Val Leu Val Ile Pro Glu Trp Glu Ala Gln Val Ser Gln Glu Val		

995	1000	1005
Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Asn Lys		
1010	1015	1020
Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn His		
1025	1030	1035
1040		
Thr Glu Lys Leu Lys Phe Arg Asn Cys Glu Glu Glu Val Tyr Pro		
1045	1050	1055
Asn Asn Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gln Gly Thr		
1060	1065	1070
Ala Gly Cys Ala Asp Ala Cys Asn Thr Arg Asn Val Gly Tyr Glu Asp		
1075	1080	1085
Ala Tyr Glu Met Asn Thr Thr Ser Val Asn Tyr Lys Pro Thr Tyr		
1090	1095	1100
Glu Glu Glu Val Tyr Thr Asp Gly Arg Arg Asp Asn Pro Cys Glu Met		
1105	1110	1115
1120		
Glu Arg Gly Tyr Thr Pro Leu Pro Val Gly Tyr Val Thr Lys Glu Leu		
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Glu Tyr Phe Pro Glu Thr Asn Thr Val Trp Ile Glu Ile Gly Glu Thr		
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tgt ggt tgt gcg tca gat gat gtt gtt caa tac cct ttg gca aga gat Cys Gly Cys Ala Ser Asp Asp Val Val Gln Tyr Pro Leu Ala Arg Asp 20                   25                   30	96
ccg aat gct gta ttc caa aat atg cat tat aaa gat tat ttg caa acg Pro Asn Ala Val Phe Gln Asn Met His Tyr Lys Asp Tyr Leu Gln Thr 35                   40                   45	144
tat gat gga gac tat aca ggt tct ttt ata aat cct aac tta tct att Tyr Asp Gly Asp Tyr Thr Gly Ser Phe Ile Asn Pro Asn Leu Ser Ile	192

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gaa gca gta gta ggg aca gca gcg gat cat tta acg gga tta cac gat Glu Ala Val Val Gly Thr Ala Ala Asp His Leu Thr Gly Leu His Asp 130 135 140			432
aat tat gag tta tat gta gag gca ttg gaa gaa tgg ctg gaa aga ccg Asn Tyr Glu Leu Tyr Val Glu Ala Leu Glu Trp Leu Glu Arg Pro 145 150 155 160			480
aat gct gct aga act aat cta ctt ttt aat aga ttt acc acc cta gat Asn Ala Ala Arg Thr Asn Leu Leu Phe Asn Arg Phe Thr Thr Leu Asp 165 170 175			528
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caa aac tac gca gtt cca tta ctt aca gta tac gca caa gca gcg aac Gln Asn Tyr Ala Val Pro Leu Leu Thr Val Tyr Ala Gln Ala Ala Asn 195 200 205			624
ctt cat ttg tta tta aag gat gct gaa ata tat gga gca aga tgg Leu His Leu Leu Leu Lys Asp Ala Glu Ile Tyr Gly Ala Arg Trp 210 215 220			672
gga ctg aac caa aat cag att aac tca ttc cat acg cgc caa caa gag Gly Leu Asn Gln Asn Gln Ile Asn Ser Phe His Thr Arg Gln Gln Glu 225 230 235 240			720
cgt act caa tat tat aca aat cat tgc gta acg acg tat aat acc ggt Arg Thr Gln Tyr Tyr Thr Asn His Cys Val Thr Tyr Asn Thr Gly 245 250 255			768
tta gat aga tta aga ggc aca aat act gaa agt tgg tta aat tat cat Leu Asp Arg Leu Arg Gly Thr Asn Thr Glu Ser Trp Leu Asn Tyr His 260 265 270			816
cga ttc cgt aga gag atg aca tta atg gca atg gat tta gtg gcc tta Arg Phe Arg Arg Glu Met Thr Leu Met Ala Met Asp Leu Val Ala Leu 275 280 285			864

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aat cag gga atc tgc cga cgt tgg ggg aat aat cct tat aat aca ttt Asn Gln Gly Ile Cys Arg Arg Trp Gly Asn Asn Pro Tyr Asn Thr Phe 325 330 335	1008
tct gaa ctt gaa aat gct ttt att cgc ccg cca cat ctt ttt gat agg Ser Glu Leu Glu Asn Ala Phe Ile Arg Pro Pro His Leu Phe Asp Arg 340 345 350	1056
ttg aat aga tta act att tct aga aac cga tat aca gct cca aca act Leu Asn Arg Leu Thr Ile Ser Arg Asn Arg Tyr Thr Ala Pro Thr Thr 355 360 365	1104
aat agc tac cta gac tat tgg tca ggt cat act tta caa agc cag tat Asn Ser Tyr Leu Asp Tyr Trp Ser Gly His Thr Leu Gln Ser Gln Tyr 370 375 380	1152
gca aat aac ccg acg aca tat gaa act agt tac ggt cag att acc tct Ala Asn Asn Pro Thr Thr Tyr Glu Thr Ser Tyr Gly Gln Ile Thr Ser 385 390 395 400	1200
aac aca cgt tta ttc aat acg act aat gga gcc aat gca ata gat tca Asn Thr Arg Leu Phe Asn Thr Asn Gly Ala Asn Ala Ile Asp Ser 405 410 415	1248
agg gca aga aat ttt ggt aac tta tac gct aat ttg tat ggt gtt agc Arg Ala Arg Asn Phe Gly Asn Leu Tyr Ala Asn Leu Tyr Gly Val Ser 420 425 430	1296
tat ttg aat att ttc cca aca ggt gtg atg agt gaa atc acc tca gcc Tyr Leu Asn Ile Phe Pro Thr Gly Val Met Ser Glu Ile Thr Ser Ala 435 440 445	1344
cct aat acg tgt tgg caa gac ctt act aca act gag gaa cta cca cta Pro Asn Thr Cys Trp Gln Asp Leu Thr Thr Glu Glu Leu Pro Leu 450 455 460	1392
gtg aat aat aat ttt aat ctt tta tct cat gtt act ttc tta cgc ttc Val Asn Asn Asn Phe Asn Leu Leu Ser His Val Thr Phe Leu Arg Phe 465 470 475 480	1440
aat act act cag ggt ggc ccc ctt gca act gta ggg ttt gta ccc aca Asn Thr Gln Gly Gly Pro Leu Ala Thr Val Gly Phe Val Pro Thr 485 490 495	1488
tat gtg tgg aca cgt caa gat gta gat ttt aat aat ata att act ccc Tyr Val Trp Thr Arg Gln Asp Val Asp Phe Asn Asn Ile Ile Thr Pro 500 505 510	1536

aat aga att actcaa atcca gtt gta aag gca tat gag cta agt agt Asn Arg Ile Thr Gln Ile Pro Val Val Lys Ala Tyr Glu Leu Ser Ser 515 520 525	1584
ggt gct act gtc gtg aaa ggt cca gga ttc aca gga gga gat gta atc Gly Ala Thr Val Val Lys Gly Pro Gly Phe Thr Gly Gly Asp Val Ile 530 535 540	1632
cga aga aca aat act ggt gga ttc gga gca ata agg gtt tcg gtc act Arg Arg Thr Asn Thr Gly Gly Phe Gly Ala Ile Arg Val Ser Val Thr 545 550 555 560	1680
gga ccg cta aca caa cga tat cgc ata agg ttc cgt tat gct tcg aca Gly Pro Leu Thr Gln Arg Tyr Arg Ile Arg Phe Arg Tyr Ala Ser Thr 565 570 575	1728
ata gat ttt gat ttc ttt gta aca cgt gga gga act act ata aat aat Ile Asp Phe Asp Phe Val Thr Arg Gly Gly Thr Thr Ile Asn Asn 580 585 590	1776
ttt aga ttt aca cgt aca atg aac agg gga cag gaa tca aga tat gaa Phe Arg Phe Thr Arg Thr Met Asn Arg Gly Gln Glu Ser Arg Tyr Glu 595 600 605	1824
tcc tat cgt act gta gag ttt aca act cct ttt aac ttt aca caa agt Ser Tyr Arg Thr Val Glu Phe Thr Thr Pro Phe Asn Phe Thr Gln Ser 610 615 620	1872
caa gat ata att cga aca tct atc cag gga ctt agt gga aat ggg gaa Gln Asp Ile Ile Arg Thr Ser Ile Gln Gly Leu Ser Gly Asn Gly Glu 625 630 635 640	1920
gta tac ctt gat aga att gaa atc atc cct gta aat cca aca cga gaa Val Tyr Leu Asp Arg Ile Glu Ile Ile Pro Val Asn Pro Thr Arg Glu 645 650 655	1968
gcg gaa gag gat tta gaa gcg gcg aag aaa gcg gtt gtc agc ttg ttt Ala Glu Glu Asp Leu Glu Ala Ala Lys Lys Ala Val Ala Ser Leu Phe 660 665 670	2016
aca cgc aca agg gac gga tta caa gta aat gtt aca gat tat caa gtc Thr Arg Thr Arg Asp Gly Leu Gln Val Asn Val Thr Asp Tyr Gln Val 675 680 685	2064
gat caa gcg gca aat tta gtt tca tgc tta tca gat gaa caa tat gcg Asp Gln Ala Ala Asn Leu Val Ser Cys Leu Ser Asp Glu Gln Tyr Ala 690 695 700	2112
cat gat aaa aag atg tta ttg gaa gcg gta cgc gcg gca aaa cgc ctc His Asp Lys Lys Met Leu Leu Glu Ala Val Arg Ala Ala Lys Arg Leu 705 710 715 720	2160
agc cga gaa cgt aac tta ctt cag gat cca gat ttt aat aca atc aat Ser Arg Glu Arg Asn Leu Leu Gln Asp Pro Asp Phe Asn Thr Ile Asn 725 730 735	2208
agt aca gaa gaa aat gga tgg aaa gca agt aac ggc gtt act att agt	2256

Ser Thr Glu Glu Asn Gly Trp Lys Ala Ser Asn Gly Val Thr Ile Ser				
740	745	750		
gag ggc ggt cca ttc tat aaa ggc cgt gca ctt cag cta gca agt gca				2304
Glu Gly Gly Pro Phe Tyr Lys Gly Arg Ala Leu Gln Leu Ala Ser Ala				
755	760	765		
cga gaa aat tac cca aca tac atc tat caa aaa gta gat gca tcg gag				2352
Arg Glu Asn Tyr Pro Thr Tyr Ile Tyr Gln Lys Val Asp Ala Ser Glu				
770	775	780		
tta aaa cct tat aca cga tat aga ctg gat ggg ttc gtg aag agt agt				2400
Leu Lys Pro Tyr Thr Arg Tyr Arg Leu Asp Gly Phe Val Lys Ser Ser				
785	790	795	800	
caa gat tta gaa att gat ctc att cac cat cat aaa gtc cat ctt gtg				2448
Gln Asp Leu Glu Ile Asp Leu Ile His His His Lys Val His Leu Val				
805	810	815		
aaa aat gta cta gat aat tta gta tct gat act tac cca gat gat tct				2496
Lys Asn Val Leu Asp Asn Leu Val Ser Asp Thr Tyr Pro Asp Asp Ser				
820	825	830		
tgt agt gga atc aat cga tgt gag gaa caa cag atg gta aat gcg caa				2544
Cys Ser Gly Ile Asn Arg Cys Glu Glu Gln Gln Met Val Asn Ala Gln				
835	840	845		
ctg gaa aca gaa cat cat cat ccg atg gat tgc tgt gaa gca gct caa				2592
Leu Glu Thr Glu His His Pro Met Asp Cys Cys Glu Ala Ala Gln				
850	855	860		
aca cat gag ttt tct tcc tat att gat aca ggg gat tta aat tcg act				2640
Thr His Glu Phe Ser Ser Tyr Ile Asp Thr Gly Asp Leu Asn Ser Thr				
865	870	875	880	
gta gac cag gga atc tgg gtg atc ttt aaa gtt cga aca aca gat ggt				2688
Val Asp Gln Gly Ile Trp Val Ile Phe Lys Val Arg Thr Thr Asp Gly				
885	890	895		
tat gcg acg cta gga aat ctt gaa ttg gta gag gtc gga ccg tta ttg				2736
Tyr Ala Thr Leu Gly Asn Leu Glu Leu Val Glu Val Gly Pro Leu Leu				
900	905	910		
ggt gaa cct cta gaa cgt gaa caa aga gaa aat gcg aaa tgg aat gca				2784
Gly Glu Pro Leu Glu Arg Glu Gln Arg Glu Asn Ala Lys Trp Asn Ala				
915	920	925		
gag tta gga aga aaa cgt gca gaa aca gat cgc gtg tat caa gat gcc				2832
Glu Leu Gly Arg Lys Arg Ala Glu Thr Asp Arg Val Tyr Gln Asp Ala				
930	935	940		
aaa caa tcc atc aat cat tta ttt gtg gat tat caa gat caa caa tta				2880
Lys Gln Ser Ile Asn His Leu Phe Val Asp Tyr Gln Asp Gln Gln Leu				
945	950	955	960	
aat cca caa ata ggg atg gca gat att atg gac gct caa aat ctt gtc				2928
Asn Pro Gln Ile Gly Met Ala Asp Ile Met Asp Ala Gln Asn Leu Val				

965	970	975	
gca tca att tca gat gta tat agc gat gca gta ctg caa atc cct gga Ala Ser Ile Ser Asp Val Tyr Ser Asp Ala Val Leu Gln Ile Pro Gly 980	985	990	2976
att aac tat gag att tac aca gag ctg tcc aat cgc tta caa caa gca Ile Asn Tyr Glu Ile Tyr Thr Glu Leu Ser Asn Arg Leu Gln Gln Ala 995	1000	1005	3024
tcg tat ctg tat acg tct cga aat gcg gtg caa aat ggg gac ttt aac Ser Tyr Leu Tyr Thr Ser Arg Asn Ala Val Gln Asn Gly Asp Phe Asn 1010	1015	1020	3072
aac ggg cta gat agc tgg aat gca aca gcg ggt gca tcg gta caa cag Asn Gly Leu Asp Ser Trp Asn Ala Thr Ala Gly Ala Ser Val Gln Gln 1025	1030	1035	3120
gat ggc aat acg cat ttc tta gtt ctt tct cat tgg gat gca caa gtt Asp Gly Asn Thr His Phe Leu Val Leu Ser His Trp Asp Ala Gln Val 1045	1050	1055	3168
tcc caa caa ttt aga gtg cag ccg aat tgt aaa tat gta tta cgt gta Ser Gln Gln Phe Arg Val Gln Pro Asn Cys Lys Tyr Val Leu Arg Val 1060	1065	1070	3216
aca gca gag aaa gta ggc ggc gga gac gga tac gtg act atc cgg gat Thr Ala Glu Lys Val Gly Gly Asp Gly Tyr Val Thr Ile Arg Asp 1075	1080	1085	3264
ggt gct cat cat aca gaa acg ctt aca ttt aat gca tgt gat tat gat Gly Ala His His Thr Glu Thr Leu Thr Phe Asn Ala Cys Asp Tyr Asp 1090	1095	1100	3312
ata aat ggc acg tac gtg act gat aat acg tat cta aca aaa gaa gtg Ile Asn Gly Thr Tyr Val Thr Asp Asn Thr Tyr Leu Thr Lys Glu Val 1105	1110	1115	3360
ata ttc tat tca cat aca gaa cac atg tgg gta gag gta aat gaa aca Ile Phe Tyr Ser His Thr Glu His Met Trp Val Glu Val Asn Glu Thr 1125	1130	1135	3408
gaa ggt gca ttt cat ata gat agt att gaa ttc gtt gaa aca gaa aag Glu Gly Ala Phe His Ile Asp Ser Ile Glu Phe Val Glu Thr Glu Lys 1140	1145	1150	3456
taa			3459

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<211> 1152  
<212> PRT  
<213> Bacillus thuringiensis

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Cys	Gly	Cys	Ala	
		Ser	Asp	
		Asp	Val	
		Val	Val	
		Gln	Tyr	
		Tyr	Pro	
		Pro	Leu	
		Leu	Ala	
		Arg	Arg	
		Asp		
20		25	30	
Pro	Asn	Ala	Val	
		Phe	Gln	
		Asn	Met	
		His	Tyr	
		Lys	Asp	
		Tyr	Tyr	
		Leu	Gln	
		Thr		
35		40	45	
Tyr	Asp	Gly	Asp	
		Tyr	Thr	
		Gly	Ser	
		Phe	Ile	
		Asn	Pro	
		Asn	Leu	
		Ser	Ile	
		50	55	60
Asn	Pro	Arg	Asp	
		Val	Leu	
		Gln	Thr	
		Gly	Ile	
		Asn	Ile	
		Val	Gly	
		Arg	Leu	
65		70	75	80
Leu	Gly	Phe	Leu	
	Gly	Val	Pro	
		Phe	Ala	
		Gly	Gln	
		Gln	Leu	
		Leu	Val	
		Thr	Phe	
		Tyr		
85		90	95	
Thr	Phe	Leu	Leu	
		Asn	Gln	
		Leu	Trp	
		Trp	Pro	
		Pro	Thr	
		Thr	Asn	
		Asp	Asn	
		Asn	Ala	
		Val	Trp	
100		105	110	
Glu	Ala	Phe	Met	
		Ala	Gln	
		Ile	Glu	
		Glu	Leu	
		Ile	Asn	
		Gln	Arg	
		Arg	Ile	
115		120	125	
Glu	Ala	Val	Val	
		Gly	Thr	
		Ala	Ala	
		Asp	Asp	
		His	Leu	
		Thr	Thr	
		Gly	Leu	
130		135	140	
Asn	Tyr	Glu	Leu	
		Tyr	Val	
		Glu	Ala	
		Leu	Glu	
		Glu	Trp	
		Trp	Leu	
		Leu	Glu	
145		150	155	160
Asn	Ala	Ala	Arg	
		Arg	Thr	
		Asn	Leu	
		Leu	Phe	
		Phe	Asn	
		Asn	Arg	
		Arg	Phe	
		Phe	Thr	
		Thr	Thr	
		Gly	Leu	
165		170	175	
Ser	Leu	Phe	Thr	
		Gln	Gly	
		Phe	Met	
		Met	Pro	
		Pro	Ser	
		Ser	Phe	
		Phe	Gly	
		Gly	Thr	
		Thr	Gly	
180		185	190	
Gln	Asn	Tyr	Ala	
		Val	Val	
		Pro	Leu	
		Leu	Leu	
		Leu	Thr	
		Thr	Val	
		Val	Tyr	
		Tyr	Ala	
		Ala	Gln	
		Gln	Ala	
		Ala	Asn	
195		200	205	
Leu	His	Leu	Leu	
		Leu	Leu	
		Leu	Lys	
		Lys	Asp	
		Asp	Ala	
		Ala	Glu	
		Glu	Ile	
		Ile	Tyr	
		Tyr	Gly	
210		215	220	
Gly	Leu	Asn	Gln	
		Gln	Ile	
		Ile	Asn	
		Asn	Ser	
		Ser	Phe	
		Phe	His	
		His	Thr	
		Thr	Arg	
		Arg	Gln	
225		230	235	240
Arg	Thr	Gln	Tyr	
		Tyr	Thr	
		Thr	Asn	
		Asn	His	
		His	Cys	
		Cys	Val	
		Val	Thr	
		Thr	Thr	
		Thr	Tyr	
		Tyr	Asn	
		Asn	Thr	
		Thr	Gly	
245		250	255	
Leu	Asp	Arg	Leu	
		Arg	Arg	
		Arg	Gly	
		Gly	Thr	
		Thr	Asn	
		Asn	Thr	
		Thr	Glu	
260		265	270	
Arg	Phe	Arg	Arg	
		Arg	Glu	
		Glu	Met	
		Met	Thr	
		Leu	Met	
		Met	Ala	
		Ala	Met	
		Met	Asp	
		Asp	Leu	
		Leu	Val	
		Val	Ala	
275		280	285	
Phe	Pro	Tyr	Tyr	
		Tyr	Asn	
		Asn	Val	
		Val	Arg	
		Arg	Gln	
		Gln	Tyr	
		Tyr	Pro	
		Pro	Asn	
		Asn	Gly	
		Gly	Ala	
		Ala	Asn	
		Asn	Pro	
		Pro	Gln	
290		295	300	
Leu	Thr	Arg	Glu	
		Glu	Ile	
		Ile	Tyr	
		Tyr	Thr	
		Thr	Asp	
		Asp	Pro	
		Pro	Ile	
		Ile	Val	
		Val	Tyr	
		Tyr	Asn	
		Asn	Pro	
		Pro	Pro	
		Ala		

305	310	315	320
Asn Gln Gly Ile Cys Arg Arg Trp Gly Asn Asn Pro Tyr Asn Thr Phe			
325		330	335
Ser Glu Leu Glu Asn Ala Phe Ile Arg Pro Pro His Leu Phe Asp Arg			
340		345	350
Leu Asn Arg Leu Thr Ile Ser Arg Asn Arg Tyr Thr Ala Pro Thr Thr			
355		360	365
Asn Ser Tyr Leu Asp Tyr Trp Ser Gly His Thr Leu Gln Ser Gln Tyr			
370		375	380
Ala Asn Asn Pro Thr Thr Tyr Glu Thr Ser Tyr Gly Gln Ile Thr Ser			
385		390	395
Asn Thr Arg Leu Phe Asn Thr Thr Asn Gly Ala Asn Ala Ile Asp Ser			
405		410	415
Arg Ala Arg Asn Phe Gly Asn Leu Tyr Ala Asn Leu Tyr Gly Val Ser			
420		425	430
Tyr Leu Asn Ile Phe Pro Thr Gly Val Met Ser Glu Ile Thr Ser Ala			
435		440	445
Pro Asn Thr Cys Trp Gln Asp Leu Thr Thr Glu Glu Leu Pro Leu			
450		455	460
Val Asn Asn Asn Phe Asn Leu Leu Ser His Val Thr Phe Leu Arg Phe			
465		470	475
Asn Thr Thr Gln Gly Gly Pro Leu Ala Thr Val Gly Phe Val Pro Thr			
485		490	495
Tyr Val Trp Thr Arg Gln Asp Val Asp Phe Asn Asn Ile Ile Thr Pro			
500		505	510
Asn Arg Ile Thr Gln Ile Pro Val Val Lys Ala Tyr Glu Leu Ser Ser			
515		520	525
Gly Ala Thr Val Val Lys Gly Pro Gly Phe Thr Gly Gly Asp Val Ile			
530		535	540
Arg Arg Thr Asn Thr Gly Gly Phe Gly Ala Ile Arg Val Ser Val Thr			
545		550	555
Gly Pro Leu Thr Gln Arg Tyr Arg Ile Arg Phe Arg Tyr Ala Ser Thr			
565		570	575
Ile Asp Phe Asp Phe Phe Val Thr Arg Gly Gly Thr Thr Ile Asn Asn			
580		585	590
Phe Arg Phe Thr Arg Thr Met Asn Arg Gly Gln Glu Ser Arg Tyr Glu			
595		600	605
Ser Tyr Arg Thr Val Glu Phe Thr Thr Pro Phe Asn Phe Thr Gln Ser			

610	615	620
Gln Asp Ile Ile Arg Thr Ser Ile Gln Gly Leu Ser Gly Asn Gly Glu		
625	630	635
640		
Val Tyr Leu Asp Arg Ile Glu Ile Ile Pro Val Asn Pro Thr Arg Glu		
645	650	655
Ala Glu Glu Asp Leu Glu Ala Ala Lys Lys Ala Val Ala Ser Leu Phe		
660	665	670
Thr Arg Thr Arg Asp Gly Leu Gln Val Asn Val Thr Asp Tyr Gln Val		
675	680	685
Asp Gln Ala Ala Asn Leu Val Ser Cys Leu Ser Asp Glu Gln Tyr Ala		
690	695	700
His Asp Lys Lys Met Leu Leu Glu Ala Val Arg Ala Ala Lys Arg Leu		
705	710	715
720		
Ser Arg Glu Arg Asn Leu Leu Gln Asp Pro Asp Phe Asn Thr Ile Asn		
725	730	735
Ser Thr Glu Glu Asn Gly Trp Lys Ala Ser Asn Gly Val Thr Ile Ser		
740	745	750
Glu Gly Gly Pro Phe Tyr Lys Gly Arg Ala Leu Gln Leu Ala Ser Ala		
755	760	765
Arg Glu Asn Tyr Pro Thr Tyr Ile Tyr Gln Lys Val Asp Ala Ser Glu		
770	775	780
Leu Lys Pro Tyr Thr Arg Tyr Arg Leu Asp Gly Phe Val Lys Ser Ser		
785	790	795
800		
Gln Asp Leu Glu Ile Asp Leu Ile His His His Lys Val His Leu Val		
805	810	815
Lys Asn Val Leu Asp Asn Leu Val Ser Asp Thr Tyr Pro Asp Asp Ser		
820	825	830
Cys Ser Gly Ile Asn Arg Cys Glu Glu Gln Gln Met Val Asn Ala Gln		
835	840	845
Leu Glu Thr Glu His His Pro Met Asp Cys Cys Glu Ala Ala Gln		
850	855	860
Thr His Glu Phe Ser Ser Tyr Ile Asp Thr Gly Asp Leu Asn Ser Thr		
865	870	875
880		
Val Asp Gln Gly Ile Trp Val Ile Phe Lys Val Arg Thr Thr Asp Gly		
885	890	895
Tyr Ala Thr Leu Gly Asn Leu Glu Leu Val Glu Val Gly Pro Leu Leu		
900	905	910
Gly Glu Pro Leu Glu Arg Glu Gln Arg Glu Asn Ala Lys Trp Asn Ala		

915	920	925
Glu Leu Gly Arg Lys Arg Ala Glu Thr Asp Arg Val Tyr Gln Asp Ala		
930	935	940
Lys Gln Ser Ile Asn His Leu Phe Val Asp Tyr Gln Asp Gln Gln Leu		
945	950	955
Asn Pro Gln Ile Gly Met Ala Asp Ile Met Asp Ala Gln Asn Leu Val		
965	970	975
Ala Ser Ile Ser Asp Val Tyr Ser Asp Ala Val Leu Gln Ile Pro Gly		
980	985	990
Ile Asn Tyr Glu Ile Tyr Thr Glu Leu Ser Asn Arg Leu Gln Gln Ala		
995	1000	1005
Ser Tyr Leu Tyr Thr Ser Arg Asn Ala Val Gln Asn Gly Asp Phe Asn		
1010	1015	1020
Asn Gly Leu Asp Ser Trp Asn Ala Thr Ala Gly Ala Ser Val Gln Gln		
1025	1030	1035
Asp Gly Asn Thr His Phe Leu Val Leu Ser His Trp Asp Ala Gln Val		
1045	1050	1055
Ser Gln Gln Phe Arg Val Gln Pro Asn Cys Lys Tyr Val Leu Arg Val		
1060	1065	1070
Thr Ala Glu Lys Val Gly Gly Asp Gly Tyr Val Thr Ile Arg Asp		
1075	1080	1085
Gly Ala His His Thr Glu Thr Leu Thr Phe Asn Ala Cys Asp Tyr Asp		
1090	1095	1100
Ile Asn Gly Thr Tyr Val Thr Asp Asn Thr Tyr Leu Thr Lys Glu Val		
1105	1110	1115
Ile Phe Tyr Ser His Thr Glu His Met Trp Val Glu Val Asn Glu Thr		
1125	1130	1135
Glu Gly Ala Phe His Ile Asp Ser Ile Glu Phe Val Glu Thr Glu Lys		
1140	1145	1150

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 cry1B.fw

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<210> 8  
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<220>  
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<210> 13  
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cgacagtags acccactact 20